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December 1, 1987, Volume 191, Number 11

JOURNAL

OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

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JOURNAL

OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

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Vol 191 December 1, 1987 No. 11
JAVMA 191(11) 1345-1524 (1987)
ISSN 0003-1488

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About the cover

"Girl with Cat" was painted in 1856 by American-born, French-trained artist William Morris Hunt. The simple composition and warm but subdued color evident in this painting is characteristic of the mid-nineteenth century movements in French painting, as practiced by the artists of the Barbizon school. Hunt returned to the United States in 1855 and is credited with introducing to this country the work of Millet, Corot, and others from the Barbizon school.

Reproduction of this 42 × 33½ inch oil-on-canvas painting (00.504, Bequest of Edmund Dwight) was made possible through the Museum of Fine Arts, Boston.

Summary report of pilot projects for eradication of pseudorabies in swine

David Thawley, BVSc, PhD; George Beran, DVM, PhD; Alex Hogg, DVM, MS; Donald Gustafson, DVM, PhD; Ralph Vinson, DVM

Four times in the past decade, the Animal and Plant Health Inspection Service of the United States Department of Agriculture (USDA/APHIS) coordinated national serologic surveys of slaughtered swine to assess the prevalence of pseudorabies (PR) state by state. The findings for the total United States showed a steady increase from 0.56% in 1974 to 8.78% in 1984.[1] Of the 5 project states, Illinois and Iowa have a high prevalence of PR, and North Carolina, Pennsylvania, and Wisconsin have a relatively low prevalence of PR (Table 1).

In early 1983, the National Pork Producer's Council (NPPC) proposed to APHIS that pilot projects be conducted in several states, with joint financial sponsorship of NPPC and APHIS.[2] The project objectives, as set forth by the NPPC, were:

- Pilot projects should be designed to determine the practicality of area eradication of PR.
- Pilot projects should be designed to provide definite answers as to whether eradication of PR is achievable.
- Federal and state governments as well as producers must accept the results of the projects and modify approaches as necessary.
- A technical advisory committee should decide technical aspects of pilot project designs.

Five pilot projects were proposed: one in Illinois for Pike and Macoupin Counties, one in Marshall County, Iowa, and statewide eradication programs in North Carolina, Pennsylvania, and Wisconsin.

The Technical Advisory Committee was appointed by NPPC and USDA/APHIS to oversee the technical functioning of the pilot projects. Project plans were drawn up by each pilot state and reviewed by the Technical Advisory Committee. All projects were based on herd clean-up procedures of the Livestock Conservation Institute Guidelines.[3,4]

Table 1—Result of pseudorabies serologic surveys on slaughter swine (% positive by serum neutralization test)

Year	1974	1977-1978	1980-1981	1983-1984 Breeders	1983-1984 Market hogs
Total United States	0.56%	3.73%	8.39%	18.80%	8.18%
Pilot project states					
Illinois	1.14	3.29	6.40	17.05	6.75
Iowa	0.55	5.82	13.04	34.29	14.14
North Carolina	0	3.44	6.45	0	5.87
Pennsylvania	2.20	1.59	10.53	6.25	5.21
Wisconsin	0.52	1.41	2.96	4.76	1.74

The Illinois project used farm-to-farm sampling in a voluntary program, with quarantine of all infected herds and optional vaccination by permit only. Most herd clean ups were by test and removal or by depopulation.[a]

The Iowa project also used farm-to-farm sampling for the detection of PR-positive herds, with all swine farmers in the county voluntarily participating. Vaccination of female breeding stock was encouraged in infected herds and in herds considered to have a high risk of infection. Most herd clean ups were by offspring segregation and vaccination.[b]

North Carolina, in a statewide project in February 1984, used slaughter sampling with traceback and quarantine of all infected farms. Vaccination was by permit only. On Sept 30, 1986, the project was still in the early stages of herd and area clean up.[c]

Detection of PR-positive herds in the statewide Pennsylvania project was by slaughter sampling with traceback, together with quarantine of infected farms and shipment from infected herds to slaughter only under permit. Herd clean ups were accomplished principally by depopulation and were designed so as to reasonably expect clean up within 8 months.[d]

The authors constitute the Pseudorabies Technical Advisory Committee, appointed by the National Pork Producers Council and the USDA Animal and Plant Health Inspection Service. Dr. Thawley is from the College of Veterinary Medicine, University of Minnesota, St Paul, Minn; Dr. Beran is from the College of Veterinary Medicine, Iowa State University; Dr. Hogg is from the Department of Veterinary Science, University of Nebraska; Dr. Gustafson is from the College of Veterinary Medicine, Purdue University; and Dr. Vinson is in private practice in Oneida, Ill.

[a]Meat, Poultry and Livestock Division, Illinois Department of Agriculture, Springfield, Ill: Unpublished data, 1986.

[b]Division of Animal Industry, Iowa Department of Agriculture, Des Moines, Iowa: Unpublished data, 1986.

[c]North Carolina Department of Agriculture, Raleigh, NC: Unpublished data, 1986.

[d]Bureau of Animal Industry, Department of Agriculture, Harrisburg, Pa: Unpublished data, 1986.

The Wisconsin project was incorporated into the existing state eradication program. Detection of PR-positive herds was accomplished by testing breeding swine at slaughter, with traceback and quarantine of all known infected herds. Plans were designed to assure clean up within a 2-year period.[c]

Diagnostic tests and surveillance methods

The serum neutralization (SN) test, which measures virus neutralizing IgG, was the standard laboratory test for detecting the pseudorabies virus (PRV) infection in swine.[5] The SN test was used extensively in all the pilot projects.

The ELISA primarily measures IgG antibodies and detects infected swine more quickly, usually in about 7 days after infection.[6] The ELISA was utilized extensively in Illinois, North Carolina, and Pennsylvania as a screening test together with the SN test.

Two methods of detecting infected herds were used in the pilot projects: on-farm testing and slaughter sampling. Pennsylvania, Wisconsin, and North Carolina used slaughter sampling of culled breeding stock and traceback. These states tested sera from as many culled stock as could be identified and collected.

On-farm herd testing was used in the Iowa and Illinois projects, where area projects were less than statewide, and where herd prevalence of infection was 10 to 15%. Both projects used voluntary participation of area swine producers.

Clean up of infected herds

In each pilot project, a herd clean-up plan was developed for most herds identified as seropositive for PRV. Clean up of infected herds was voluntary except in Wisconsin and Pennsylvania. The plans developed by the Livestock Conservation Institute for the removal of PRV from herds of swine were the basis of these herd plans. All plans have been successfully applied in the pilot projects. Outlines of the clean-up plans are listed.

Offspring segregation without vaccination

- Select replacement gilts from progeny at weaning time, and raise in segregated facility. Test them at 5½ to 6 months old. If any are seropositive, remove promptly and retest in 30 to 60 days, or sell entire replacement group and start over.
- Isolate and test all replacement boars.
- Progressively depopulate, clean, and disinfect units, with at least a 30-day empty time for each unit.

Offspring segregation with controlled vaccination

Vaccination of breeding herd and progeny may be used to halt or prevent clinical epizootics.

- Select replacement gilts from progeny at weaning time.
- Raise in segregated facility.
- Test at 5½ to 6 months old. If any are seropositive, remove promptly and retest in 30 to 60 days, or sell entire replacement group and start over.
- May vaccinate replacement gilts at 1 or more of the following times: 1) At weaning if transmission is still probable, 2) at 5½ to 6 months old if seronegative, or 3) at 1 month before farrowing.
- Isolate and test all replacement boars.
- Rotate out all old breeding herd, using a progressive 30-day down time for each unit.

Test and removal of seropositive pigs (titer >1:4)

- Consider whether initial testing indicates absence of current spread of PRV, ie, by finding low rate of positive reactions or by finding generally low titers (titers ≤1:16).
- Test entire breeding herd and immediately remove all seropositve animals.
- Every 30 days, retest entire breeding herd and replacement gilts, to remove all seropositive animals, then continue testing until no more seropositive animals are found.

Depopulation/repopulation

- Depopulate entire farm of all hogs (sows usually sold after pigs are weaned and growers usually fed out to market weight).
- Clean hog units, feeders, and equipment thoroughly.
- Remove manure from pens and pump pits.
- Disinfect all units.
- Repopulate from seronegative herds.

The descriptive data and results of the pilot projects are given in Tables 2–4.

Results of initial case finding (detection of infected herds)

On-farm testing (Illinois and Iowa)—At the initiation of the projects, there were 13 quarantined herds in the Illinois project area and 11 in the Iowa project area. In the initial case-finding period, 19 additional infected herds were identified by serotest in the Illinois project area, and 18 were identified by serotest and 1 by virus isolation in the Iowa project area. Of the 62 infected herds initially identified in these 2 states, 37 (59%) were recognized only by serotest. Both states used on-farm sampling. The cost of blood testing (paid by the program) per herd identified as seropositive was $642.

Statistical herd sampling was designed to provide a 95% probability of detecting infection in a herd in which 10% of the animals are PRV-seropositive. The size of sample required to detect

[c]Animal Health Division, Wisconsin Department of Agriculture, Trade, and Consumer Protection, Madison, Wis: Unpublished data, 1986.

Table 2—Identification of infected herds in pilot projects

	No. of infected herds (by state)				
	Ill	Iowa	NC	Pa	Wis
Known infected herds at initiation	13	11	83	11	12
Additional herds identified as infected during first 18 months	19	21	0	20	2
Additional herds identified as infected after 18 months	6	13	0	80	35
Total infected herds in projects	38	45	83	111	49

Table 3—Results of herd clean-up progress during 3-year projects

	No. of herds in clean-up process (by state)				
	Ill	Iowa	NC	Pa	Wis
Herds identified as infected in first 18 months	32	32	...	31	14
Cleaned up	29 (91%)	31 (97%)	...	31 (100%)	13 (93%)
Herds identified as infected after 18 months	6	13	...	80	35
Cleaned up	0	5 (38%)	...	61 (76%)	22 (63%)

Table 4—Herd clean-up plans used in pilot projects

	No. of herds in a particular plan (by state)				
	Ill	Iowa	NC	Pa	Wis
Herd plans: (No. cleaned up/No. in plan)					
Depopulation/repopulation	1/1	9/10	—	75/91	16/16
Depopulated/not repopulated	7/12*	3/3	—	2/2	4/4
Test and removal of seropositive swine	17/17	4/4	—	15/18	11/11
Offspring segregation	4/4	20/28	—	—	4/4
Not yet implementing plans	4	3	—	—	14

*Only 7 of the 12 herds had completed depopulation at the completion of the project.

infected animals with this probability varied with the size of the herd to be sampled. For herds of <100 sows, a sample of 25 should be taken; for herds of 100 to 200, sample 27; for herds of 201 to 500, sample 28; and for herds >500, sample 29. It is important in statistical sampling that each group of segregated swine on the same farm be considered as separate herds.

Overall, in the Illinois project area, 93% of all herds were enrolled, with 19.3% of herds and 17.2% of all swine tested being seropositive. In Iowa, the corresponding figures were 99% herd participation, with 14.6% of herds and 21.1% of all swine tested being seropositive. In infected herds in Iowa, an average of 57.5% of breeding stock were seropositive.

In Illinois, 166 farms, 32 of them infected, were initially enrolled in the project. In Iowa, 213 farms, 30 of them infected, were initially enrolled. Clean-up plans were developed for each infected herd, and monitoring tests were scheduled for herds initially identified as clean.

Slaughter sampling (North Carolina, Pennsylvania, Wisconsin)—At the initiation of the projects, there were 83 PR-quarantined herds in North Carolina, 11 in Pennsylvania, and 12 in Wisconsin. Slaughter sampling was used throughout the project periods in these 3 states, with additional testing of breeding stock that passed through markets in Wisconsin. A total of 287,803 swine were tested in the 3 states. In North Carolina, 7.3% of 56,202 swine were seropositive. Only 1.2% of 184,786 swine from Pennsylvania and 1.2% of 46,615 swine from Wisconsin were seropositive.

Excluding 481 seropositive swine originating out of state, successful traceback was accomplished on 58.3% of the seropositive swine in North Carolina, 77.2% in Pennsylvania, and 95.0% in Wisconsin. Traceback to herds found to be clean by on-farm testing was a problem in all 3 states, with 10.4% of seropositive swine in these 3 states being traced back to herds in which seropositive swine could not be found. Traceback to herds known to be infected also increased the cost and labor for finding infected herds (33.7% of seropositve swine in North Carolina and 58.5% of seropositive swine in Wisconsin were traced back to known infected herds).

During the project periods, slaughter sampling identified 29 infected herds in North Carolina, 27 in Pennsylvania, and 11 in Wisconsin. Thus, overall in the 3 states, 67 infected herds were identified on the basis of testing of sera collected at slaughter and markets. This represents the finding of 1 infected herd for every 4,296 serum samples collected and tested.

By slaughter sampling, an average of approximately 2 sows/herd were sampled annually. (This does not represent adequate herd sampling, as this level of sampling will detect only about 50% of herds with 40% seroprevalence for PRV).[7] By slaughter sampling, the costs of blood testing (collection and analysis) to detect each PRV-positive herd was $3,000.

Results of herd clean up

Swine Farms with Sow Herds

Depopulation/repopulation—In total, 119 herds participated in a program of depopulation followed by repopulation. In Wisconsin, 16 of 16 herd owners successfully removed PRV from their herds by this practice. Figures for Illinois, Iowa, and Pennsylvania were 1 of 1, 9 of 10, and 75 of 91, respectively. Herds that had not fully cleaned up by Sept 30, 1986, represented recent infections in herds that had not fully completed the depopulation/repopulation process. One Iowa herd owner had successfully completed depopulation/repopulation and had established a PR-controlled vaccinated herd, but the herd became reinfected 22 months later. Epidemiologic evidence suggested this infection originated from area spread. Clean-up time (time from the beginning of depopulation to completed repopulation and recertification) varied considerably among herds. Where an immediate depopulation was used, clean-up time was 2 to 3 months. However, when a more phased type of depopulation was used, clean-up time ranged from 5 to 28 months.

Much of this variability was attributed to practices dictated by the producer. In general, phased-type depopulation/repopulation took a minimum of 6 to 8 months. In total, all herd owners who completed depopulation/repopulation were able to remove PRV from their premises.

Depopulation without repopulation—Depopulation without repopulation represents the process of herd depopulation without the short-term objective of repopulating the herd. During the pilot project period, 20 herd owners depopulated without repopulating. Reasons for undertaking this action were varied. In many cases, PR in the herd may have been only a secondary reason for the depopulation. Time to depopulate ranged from 7 to 29 months (average, 17 months). In many herds, the depopulation was prolonged, as the farms often functioned as feeder/finisher operations for an indefinite period before finally selling all swine.

Test and removal—Fifty herd owners used a test-and-removal procedure. In 47 (96%) of these herds, recertification was complete by Sept 30, 1986. In all these herds, additional seropositive swine were not found after the first complete herd test and removal. The initial PRV seroprevalence in herds in which test and removal were used ranged from 0.4 to 25%. State averages (initial seroprevalence) were: Illinois, 17% (17 herds); Iowa, 0.4% (4 herds); Pennsylvania, 3% (18 herds); and Wisconsin, 25% (11 herds). Full clean-up time (time from quarantine to recertification) averaged 4 to 5 months. This time also varied by state: Illinois, 3 months; Iowa, 7 months; Pennsylvania, 6 months; and Wisconsin, 6 months. Much of this variability was attributable to the scheduling of blood testing. In summary, test and removal was successful in removing PRV from all herds in which it was used for 2 complete herd tests. On Sept 30, 1986, 3 herds in Pennsylvania had not completed the testing regimen for recertification.

Offspring segregation—Thirty-six herd owners undertook an offspring segregation procedure. Thirty (83%) successfully removed PRV from their herds. Of those herds that were in a clean-up program for at least 18 months, all but 1 (in Iowa) was successfully cleaned up. In the single herd in Iowa that remained infected, the owner failed to follow the herd plan and mixed infected gilts with segregated offspring. As of Sept 30, 1986, 5 other herds in Iowa remained in the active phases of offspring segregation. Each of these herds had been newly identified as infected within the past 18 months.

Average herd size of herds attempting offspring segregation was approximately 100 sows, and average clean-up time (quarantine to recertification) was 16 months (range, 4 to 31 months).

Feeder Pig Finishing Farms Only

The projects in Iowa and Pennsylvania studied the effectiveness of various clean-up procedures on feeder pig feedlots. In Iowa, 2 feedlots (mean, 300 pigs) were depopulated without repopulating. In another 2 herds (mean, 850 pigs), PRV was successfully removed by depopulation/repopulation. In Pennsylvania, 26 herds (mean population, 470; range, 8 to 2,400 pigs) were successfully cleared of PRV infection by depopulation/repopulation. In 6 Pennsylvania feedlots (mean, 1,317 pigs; range, 160 to 3,000 pigs), PRV was successfully removed by identifying and segregating seropositive lots until slaughter.

Summary of herd clean up

A total of 253 infected herds were identified by the pilot projects. In the project states, of the 119 infected herds involved in a clean-up program at least 18 months before Sept 30, 1986, 116 (97.5%) had been recertified by that date. In only 3 herds in Illinois and 1 in Iowa was the owner unable to remove all seropositive swine within this period.

During the project period, additional herds were identified as infected. Many of these were identified in the latter months of these project periods. One hundred thirty-four of the herds were in this category. Many of these originated from new foci of infection in Pennsylvania (80 herds) and in Wisconsin (35 herds). In many of these herds, there was insufficient time to complete clean up before Sept 30, 1986.

Herd owners who successfully removed PRV spent from 1 to 31 months (mean, approximately 12 months) in the clean-up process. This represented the time from initial quarantine or identification of the infected herd to the time the herd was certified as PRV-free. As the projects continued, clean-up times became shorter. This was explained by the new knowledge obtained during the early stages of the projects, which permitted more efficient herd plans to be instituted. For example, in Iowa, over the 3-year project period, the mean clean-up time was reduced from 16.6 months to 8.6 months.

In all pilot project states, the mean number of sows in infected herds was 117, which compares with mean sow herd size in the United States of approximately 20.[f] In the Iowa project area, the mean number of sows in infected herds was 107. The mean number of sows in PRV-negative herds was 82.

Each participating herd in the Illinois and Iowa projects was classified as PRV-free or as infected on the basis of results of the initial serotests. Pseudorabies was detected during subsequent monitoring tests in 4 Illinois and 13 Iowa herds that were initially classified as PRV-free.

The sources of new herd infections within the Iowa and Illinois project areas were investigated. Of 14 new infections, 9 were attributed to producer errors such as movement of infected swine, and 5 were attributed to area spread from clinical epi-

[f]National Pork Producer's Assoc, Des Moines, Iowa.

zootics on farms outside project areas to neighboring farms within project areas. The source of infection in 3 herds was unknown.

Conclusions

Pseudorabies area control is feasible by applying currently available methods that are acceptable to pork producers and to the program coordinators.

- In the pilot project states, 97.5% of the 116 herds identified as infected during the first 18 months of the program were cleaned up. Considering the large number of herds in the category, we conclude that the removal of PRV from individual herds is feasible.
- Pseudorabies control/eradication programs are most effective if applied on an area basis. All infected herds in the control area should be identified, and herd clean-up plans should be coordinated simultaneously.
- The development of individual herd plans to fit the epidemiologic and managerial characteristics of each farm is essential to effective herd clean up.
- All methods for herd clean up listed in the new Livestock Conservation Institute guidelines were effectively used in the pilot projects.
- Movement of swine into and within control areas must be regulated to prevent spread of PRV to uninfected herds. This is true for both breeding stock and feeder pigs.
- Statistical sampling of herds based on 95% probability of detecting infection in herds, in which at least 10% of breeding stock are seropositive, proved successful in identifying infected herds in the Iowa and Illinois projects.
- Surveillance by use of on-farm testing is recommended in areas of high prevalence of PR.
- Serotests of breeding stock at slaughter was found to be inefficient. Major difficulties existed in the traceback of tested swine to their herds of origin and in falsely tracing seropositive swine to herds found to be PRV-free by further on-farm testing.
- The test and removal procedure was used effectively in 47 herds in which it was fully implemented. It was lowest in cost to the producer and least disruptive to management in herds in which a low percentage of breeding stock was seropositive and in which there was no evidence of current virus spread.
- Offspring segregation that permits retention of blood lines was successfully used in 97% of 31 herds. Effective isolation facilities are needed.
- Depopulation/repopulation was successful in 102 breeding herds in which it was fully implemented, but it was costly to most farmers. This method appears to have greatest application in areas of very low prevalence (ie, to remove infection from a herd in an otherwise PRV-free county or state), in herds with other production problems, or as a method of last resort.
- Twenty-eight feeder pig finishing farms (Pennsylvania and Iowa) were successfully cleared of PRV infection by depopulation/repopulation. In large feedlots, clean up may be achieved by a phased-type depopulation and cleaning and disinfection of separate finishing units as hogs are moved to slaughter.
- The provision of vaccine by government stimulated participation in the Iowa project. The use of vaccination was compatible with the offspring segregation plan of herd clean up. Vaccine use should be regulated by state authority.
- The SN test and ELISA are the basic serodiagnostic tests currently available. The use of new sensitive and rapid tests that may be performed on site will have use in both the finding of infected herds and in the monitoring of clean up.
- Widespread herd owner cooperation is essential to the success of the control/eradication of PR on an area-wide basis.

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Economic Note

Employment, starting salaries, and educational indebtedness of 1987 graduates of US veterinary medical colleges

In cooperation with US colleges of veterinary medicine, the AVMA conducted its annual survey of the graduating classes of veterinarians in spring 1987. The primary purpose of the survey was to secure data on veterinary graduates' employment, salaries, and educational indebtedness. Of the 2,226 US graduates, 1,288 responded to the survey, a response rate of 58%.

Employment and income

At the time of the survey, 87% of the responding graduates had received at least one employment offer. This compares with 78% in 1986. The increase in the percentage of graduates receiving offers likely is attributable to the fact that the 1987 survey was conducted approximately 1 month later in the spring than in 1986. The median number of offers received was 2/graduate. At the time of the survey, 74% of the graduates had accepted positions for employment.

Regarding the graduates who had accepted employment, 80% had accepted positions as employees in private practice (Tables 1 and 2). Mean starting salaries are reported for 790 graduates who indicated annual starting salaries for full-time employment. For graduates taking positions as private practice employees, the mean starting salary was $22,152. This represents a 4.5% increase over the 1986 mean starting salary of $21,205 for private practice employees.[1]

Specifically, 39.1% of graduates entered small animal exclusive practice at a mean annual salary of $22,688, up 4.9% from 1986; 11.9% entered small animal predominant practice at a mean annual salary of $21,634, up 2.2% from 1986. Also, 13.8% entered mixed animal practice at a mean annual salary of $21,039, up 2.7%. Only 3.5% of graduates entered equine practice, and the mean starting salary was $21,907, up 3.7%. In the livestock sector, 1.8 and 9.7% of graduates entered large animal exclusive and large animal predominant practice, respectively. In large animal exclusive and large animal predominant practice, mean starting salaries were $23,557, up 7.6%, and $20,731, up 6.4%, respectively. An additional 3.6% of the respondents

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Table 1—Types of employment and starting incomes of a large sample of 1987 US veterinary medical college graduates

	Percentage of graduates	Mean starting salary (No.)	Mean additional compensation expected in 1st year (No.)
Large animal exclusive	1.8	$23,557 (14)	$2,514 (7)
Large animal predominant	9.7	22,061 (80)	2,845 (48)
Mixed animal	13.8	21,039 (112)	2,503 (77)
Small animal predominant	11.9	21,634 (94)	3,029 (60)
Small animal exclusive	39.1	22,688 (314)	2,680 (177)
Equine predominant	3.5	21,907 (29)	5,192 (14)
University	1.2	23,560 (10)	... ...
Federal government	0.4	28,333 (3)*	... ...
Military service	1.4	30,267 (12)†	... ...
State/local government	0.1	20,000 (1)	... ...
Industry/commercial	0.2	26,768 (2)	... ...
Advanced study	12.8	15,272 (95)	3,420 (20)
Self-employed	3.6	30,125 (20)	... ...
Other	0.5	16,125 (4)	... ...
	100 (834)	$21,693 (790)‡	$2,839 (403)

*Starting salary for federal government employment of veterinarians with no experience, no advanced degree other than the DVM, and not in the top 25% of their class was $22,458 (GS 9, step 1). †Starting salary for military employment for veterinarians who are single, with no prior military service, including base pay, subsistence and quarters allowance, and veterinary special pay was $26,941. ‡Of the 834 graduates reporting employment, 790 graduates reported their annual starting salary for full-time employment.

Table 2—1987 starting salaries of 790 US veterinary medical college graduates, by type of employment

Starting salaries ($)	LAE	LAP	MA	SAP	SAE	EP	U	FG	MS	SLG	IC	AS	SE	Other	Total
11,000 or less	...	1	1	...	1	...	...	...	...	...	...	2	...	1	6
11,001 to 13,000	1	...	...	...	1	...	...	...	...	...	...	8	...	...	10
13,001 to 15,000	...	...	2	2	4	3	2	...	...	...	...	54	...	...	67
15,001 to 17,000	...	...	2	2	...	1	2	...	...	...	...	19	...	...	26
17,001 to 19,000	...	5	17	16	21	5	...	...	...	...	...	7	1	1	73
19,001 to 21,000	5	17	37	27	74	3	2	...	1	1	...	1	3	2	173
21,001 to 23,000	1	33	30	23	88	6	...	1	...	...	...	1	1	...	184
23,001 to 25,000	3	22	18	16	85	7	1	...	...	...	...	2	8	...	162
25,001 to 27,000	2	...	4	4	22	2	1	1	2	...	1	1	2	...	42
27,001 to 29,000	...	1	...	...	10	...	...	...	2	...	1	...	...	...	14
29,001 to 31,000	1	1	1	4	4	1	...	...	4	...	...	...	...	...	16
31,001 to 33,000	...	...	...	...	1	1	1	...	...	...	...	...	...	...	3
More than 33,000	1	...	...	...	3	...	1	1	3	...	...	...	5	...	14

LAE = Large animal exclusive; LAP = Large animal predominant; MA = Mixed animal; SAP = Small animal predominant; SAE = Small animal exclusive; EP = Equine predominant; U = University; FG = Federal government; MS = Military service; SLG = State/local government; IC = Industrial/commercial; AS = Advanced study; SE = Self-employed.

reported they would be self-employed in private practice, with an expected mean salary of $30,125.

As in 1986, less than 2% of the graduates accepted positions with the federal government and the military service. Mean starting salaries were $28,333 and $30,287, respectively. One respondent entering state/local government reported a salary of $20,000. For 2 graduates entering the industry sector, the mean salary was $26,768.

In the academic sector, 1.2% took university positions (research or teaching) at a mean salary of $23,580, and 12.8% would begin advanced study (graduate degree, internship, or residency program) at a mean salary of $15,272.

All graduates were asked if they would receive compensation in addition to their salary in their first year of employment. One half of the graduates who reported starting salaries indicated that they would receive additional compensation within the first year. Most likely, the additional pay represents a percentage of gross income, a percentage of emergency fees, a bonus, a salary raise, or other financial compensation. Most graduates anticipating additional pay expected amounts ranging from $2,500 to $5,000.

*Table 3—Educational debt of 1987 US veterinary medical college graduates**

Debt ($)	Relative frequency (%)	Cumulative frequency† (%)
0	16.3	100.0
1 to 5,000	7.0	83.7
5,001 to 10,000	6.5	76.7
10,001 to 15,000	7.3	70.2
15,001 to 20,000	13.3	62.9
20,001 to 25,000	16.4	49.6
25,001 to 30,000	13.3	33.2
30,001 to 35,000	6.4	19.9
35,001 to 40,000	5.6	13.5
40,001 to 45,000	2.5	7.9
45,001 to 50,000	2.3	5.4
More than 50,000	3.1	3.1

*Total respondents = 1,288. †Cumulative frequency percentages represent the percentage of graduates with debt in excess of the corresponding next lowest debt interval; eg, 62.9% of the graduates reported debt in excess of $15,000.

Educational debt

All graduates were requested to indicate what their total education indebtedness would be upon graduation. For the 1,078 graduates (84%) who indicated having educational debt, the mean debt was $24,667, up 5.3% from 1986. The relative frequency distribution showed that 63% of 1987 graduates, compared with 58% of 1986 graduates, had educational debt in excess of $15,000 (Table 3).[1] Mean educational debt also was determined by the type of employment graduates accepted at the time of the survey (Table 4).

References

1. Wise JK. Employment, starting salaries, and educational indebtedness of 1986 graduates of US veterinary medical colleges. *J Am Vet Med Assoc* 1987;190: 209–210.

Table 4—1987 Educational debt of 702 US veterinary medical college graduates, by type of employment

Debt ($)	LAE	LAP	MA	SAP	SAE	EP	U	FG	MS	SLG	IC	AS	SE	Other
1 to 5,000	1	3	9	10	28	3	...	1	2	...	...	6	2	...
5,001 to 10,000	1	4	8	8	28	2	...	...	...	...	...	6	1	...
10,001 to 15,000	3	4	5	10	25	3	1	...	2	...	...	8	...	1
15,001 to 20,000	3	13	15	14	33	3	2	...	3	...	1	20	6	2
20,001 to 25,000	1	14	22	14	48	7	2	1	1	...	1	18	4	1
25,001 to 30,000	1	12	21	16	44	1	2	...	1	1	...	9	4	...
30,001 to 35,000	2	7	8	3	19	1	...	...	...	...	...	5	3	...
35,001 to 40,000	...	8	3	2	13	1	...	...	1	...	...	9	3	...
40,001 to 45,000	...	6	2	...	10	...	...	...	...	...	...	2	...	...
45,001 to 50,000	...	1	1	3	8	3	...	...	1	...	...	1	1	...
More than 50,000	...	1	4	4	14	1	1	...	...	...	...	4	...	...
Total	12	73	98	84	270	25	8	2	11	1	2	88	24	4
Mean	$19,708	$26,173	$23,988	$22,950	$24,410	$24,140	$32,500	$14,000	$21,220	$26,000	$21,500	$24,550	$25,500	$20,000

LAE = Large animal exclusive; LAP = Large animal predominant; MA = Mixed animal; SAP = Small animal predominant; SAE = Small animal exclusive; EP = Equine predominant; U = University; FG = Federal government; MS = Military service; SLG = State/local government; IC = Industrial/commercial; AS = Advanced study; SE = self-employed.